

PATENT
ATTORNEY DOCKET NO.: 05516/089003
U.S. PATENT APPLICATION SERIAL NO.: 10/774,134

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Carl M. HOFFMASTER, *et al.*
Serial No.: 10/774,134
Filed : February 6, 2004
Title : Advanced Expandable Reaming Tool

Art Unit : 3672
Examiner : Hoang C. Dang

Assistant Commissioner for Patents
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APPELLANT'S BRIEF UNDER 37 C.F.R. § 41.37

Dear Sir:

Pursuant to 37 C.F.R. § 41.37, please consider the following Appellant's Brief in the referenced Application currently before the Board of Patent Appeals and Interferences.

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I. Real Party in Interest

The real party in interest in the referenced Application is Smith International, Inc. (“Smith”). The present Application, Serial No. 10/774,134 (“the ‘134 Application”), was filed on February 6, 2004 as a divisional application claiming the benefit of United States Patent Application Serial No. 09/924,961 (“the ‘961 Application”). An Assignment transferring all interest from the inventors to Smith for the ‘961 Application was recorded by the USPTO on October 9, 2001 at Reel 012242 and Frame 0119. As the recorded Assignment explicitly incorporated all continuations and divisional applications in the transfer, Smith is the Assignee of the entire right in the present Application.

II. Related Appeals and Interferences

Issues relating to patentability of the ‘961 Application, owned by Appellant, are presently on appeal before the Board of Patent Appeals and Interferences (“the Board”). The present Application is a divisional application that properly claims the benefit of the ‘961 Application. As such, the preamble and first three clauses of independent claim 201, the only independent claim on appeal in the present ‘134 Application, are identical to the preamble and first three clauses of independent claim 132, the only independent claim on appeal in the ‘961 Application. Nevertheless, the final two clauses of claim 201 of the ‘134 Application are distinct from the final clause of claim 132 of the ‘961 Application, thereby necessitating this separate appeal.

III. Status of Claims

The present '134 Application was filed on February 6, 2004 as a divisional application claiming the benefit of the '961 Application. As such, the present application was filed with the 200 original claims of the parent application and a preliminary amendment canceling claims 1-200 and adding new claims 201-218. Therefore, as filed, the present Application included claims 201-218, of which only claim 201 was independent. Claims 201-218 are presently pending in the present Application. Claims 201-204, 206, 207, 210-212, 217, and 218 were finally rejected in an Office Action mailed on June 16, 2005. Claims 205, 208, 209, and 213-216 were objected to as being dependent on a rejected base claim but would be allowable if rewritten in independent form. Rejected claims 201-204, 206, 207, 210-212, 217, and 218 were identified for appeal in a Notice of Appeal filed on August 17, 2005. Furthermore, a Notice of Panel Decision from Pre-Appeal Brief Review was mailed on September 14, 2005 in which the Panel instructed the Appellant to proceed to the Board for appellate review.

IV. Status of Amendments

An amendment in response to a non-final Office Action was transmitted on March 15, 2005. The final Office Action dated June 16, 2005 indicates that the amendment was entered. Therefore, all amendments submitted to the Examiner during prosecution have been entered and are reflected in the Claims Appendix.

V. Summary of Claimed Subject Matter

Independent claim 201 relates to an expandable reaming tool. The expandable reaming tool includes at least two reamer pads operatively coupled to a tool body and configured to be displaced between a retracted position and an expanded position, wherein at least one blade

is formed on at least one of the at least two reamer pads. The expandable reaming tool also includes a plurality of cutting elements disposed on the at least one blade, wherein the plurality of cutting elements is arranged so as to substantially balance at least one parameter selected from axial force, lateral force, work, and mass between the at least two reamer pads. Furthermore, the expandable reaming tool is configured to ream while drilling.

As stated in the background of the present application, the cutting structure of a prior art near-bit reaming tool is typically symmetrical and includes expandable pads that may be activated through hydraulic pressure. (Application page 3, ¶¶ 7-8). The pads include cutting elements which, commonly, are PDC cutters. (*Id.*) However, the PDC cutters are generally arranged in a relatively simplistic fashion, and the entire cutting structure is, consequently, relatively rudimentary in design. (*Id.*)

As is further described in the background, one or more embodiments of the present invention may present advantages that are not present in the prior art. For example, some embodiments advantageously provide a more advanced reamer cutting structure by incorporating advanced cutting structures often used on PDC drill bits (Application page 3, ¶ 8). Accordingly, as shown and described for embodiments of the present invention (Figures 3-4, reproduced below), an expandable reamer pad **32A**, **32B** includes one or more blades **50** disposed thereon, where each blade **50** has a plurality of cutting elements **52** fitted on an edge of the blade **50** that contacts a well formation. (Application page 9, ¶ 37). Advantageously, because the plurality of cutting elements are disposed on an edge of the blade **50**, rather than on the reamer pad **32A**, **32B** itself, a clearance between a well formation and a surface of the reamer pad may be increased, thereby improving a cutting transport and drilling fluid circulation of the reaming tool (Application page 12, ¶ 44). Further, a geometric configuration of the blade may be adapted in

and 218 are patentable for at least the same reasons. Thus, for purposes of this appeal, Appellant believes that claims 201-204, 206, 207, 210-212, 217, and 218 stand or fall together.

Under 35 U.S.C. §102(b), a claim in a patent application may be rejected if it is patented or described in a printed publication in this or a foreign country, or in public use or on sale in this country, more than one year prior to the date of the application for patent in the United States. 35 U.S.C. § 102(b). Furthermore:

“Anticipation under 35 U.S.C. § 102 means lack of novelty, and is a question of fact. To anticipate, *every* element and limitation of the claimed invention *must* be found in a *single* prior art reference, *arranged as in the claim*.”

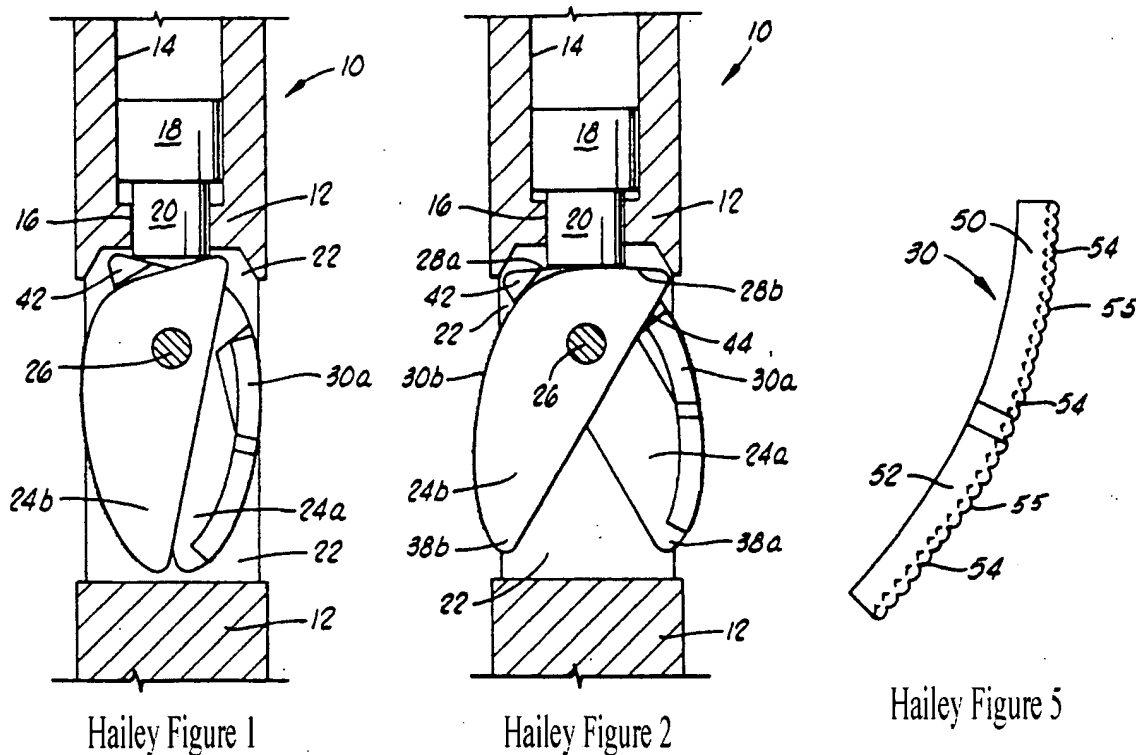
Brown v. 3M, 265 F.3d 1349, 1351 (Fed. Cir. 2001) (emphasis added). The Federal Circuit has held repeatedly that anticipation requires disclosure of each and every element of the claimed invention in a single prior art reference. *See, e.g., Schering Corp. v. Geneva Pharms.*, 339 F.3d 1373, 1377 (Fed. Cir. 2003); *Diversitech Corp. v. Century Steps, Inc.*, 850 F.2d 675, 677 (Fed. Cir. 1988); *Orthokinetics, Inc. v. Safety Travel Chairs, Inc.*, 806 F.2d 1565, 1574 (Fed. Cir. 1986). Appellant respectfully asserts the Hailey I patent does not disclose each and every element of the invention as arranged in independent claim 201 or in dependent claims 202-204, 206, 207, 210-212, 217, and 218.

A. The Pad–Blade–Cutter Limitations

Independent claim 201 recites an expandable reaming tool that includes: (a) at least two reamer pads operatively coupled to a tool body and adapted to be displaced between a retracted position and an expanded position; (b) at least one blade formed on each of the at least two reamer pads; and (c) a plurality of cutting elements disposed on the blades. Appellant

respectfully asserts that Hailey I does not disclose all three of the limitations ((a), (b), and (c) described above), as recited *and* arranged in claim 201.

In contrast, the specification and Figures 1 and 2 of Hailey I (reproduced below) disclose an expandable cutting tool that includes a pair of blades pivotally connected to a body member 12 by means of a pivot pin 26.



Because the blades of Hailey I are operatively coupled to body member 12 and adapted to be displaced between a retracted position (Figure 1) and an expanded position (Figure 2), the Appellant believes the Examiner likened the blades to the at least two reamer pads recited in claim 201. In the final Office Action, the Examiner interpreted Hailey I as disclosing reamer pads 24a and 24b moveable between a retracted position and an expanded position, at least one

blade **30a**, **30b** formed on at least one of the reamer pads, and a plurality of cutting elements **55** disposed on blades **30a** and **30b**.

In response, the Appellant respectfully asserts that the specification and Figures 1 and 2 of the Hailey I patent disclose items **24a** and **24b** as *blades* that are moveable from a retracted to an extended position. (Hailey I, column 2, lines 8-17). Therefore, Appellant notes that the blades of Hailey I are not pads. In contrast, claim 201 requires at least two reamer *pads* that may be displaced between a retracted position and an extended position, with at least one blade formed on each pad. The cutting elements are then disposed on the blades. This arrangement presents advantages that are not realized by the simple blades (without reamer pads) of Hailey I. Specifically, the claimed structure enables the geometric configuration of the blade to be adapted to provide maximum cutting element exposure. Such cutting element exposure is maximized by reducing the “dead” material between cutting elements, thus improving the longevity of the reamer by ensuring that cutting elements, not the blade material, contact the formation. However, Hailey I does not disclose the recited “at least two reamer pads,” so the Hailey I reference does not contain every element as arranged in independent claim 201.

Even if the blades **24a** and **24b** of Hailey I are taken to be the reamer pads required by claim 201, Hailey I still fails to disclose all of the remaining elements as arranged in the claim. In order to anticipate claim 201, Hailey I must separately show (b) at least one blade formed on each of the at least two reamer pads, and (c) a plurality of cutting elements disposed on the blades. Hailey I does not. Particularly, Hailey I discloses items **30a** and **30b** as “inserts” (*i.e.*, cutting elements) secured to blades **24a** and **24b**, not as the blades themselves. (Hailey I, column 2, lines 33-44). Thus, Hailey I merely discloses moveable blades **24a** and **24b** having one or more cutting element inserts **30** disposed thereon. Furthermore, in the final Office Action,

the Examiner described item **55** as a plurality of cutting elements. In response, Appellant respectfully asserts that item **55** appears only in Figure 5 (reproduced above) where it is described in the specification as “an overlay of thermally stable polycrystalline diamond,” not a plurality of cutting elements (Hailey I, column 2, line 38). As such, Hailey I does not disclose at least two reamer pads with at least one blade formed on at least one of the at least two reamer pads with a plurality of cutter elements disposed on the at least one blade as required by independent claim 201.

As the Hailey I patent does not disclose each and every element of the invention as arranged in independent claim 201, it is not a proper anticipatory reference under 35 U.S.C. §102(b). *See Brown*, 265 F.3d at 1351. Similarly, the Hailey I patent does not disclose each and every element of the invention as arranged in dependent claims 202-204, 206, 207, 210-212, 217, and 218. Therefore, Appellant respectfully requests reversal of the rejection of claims 201-204, 206, 207, 210-212, 217, and 218 under 35 U.S.C. §102(b).

B. The Balancing Limitations

In addition to the elements identified above, the Hailey I patent is not a proper anticipatory reference under 35 U.S.C. §102 as Hailey I does not disclose a plurality of cutting elements arranged to substantially balance axial force, lateral force, work, or mass between the at least two reamer pads. In the final Office Action, the Examiner theorizes that as Hailey I discloses each blade **24a** and **24b** to be identical, that the axial force, lateral force, work and mass between the two blades are inherently substantially balanced as well.

Appellant respectfully traverses on the basis that nothing in the disclosure of Hailey I explicitly or implicitly indicates such a relationship exists between blades **24a** and **24b**.

Particularly, while blades **24a** and **24b** may be identical, even assuming *arguendo* that some balancing of mass, work, and force may result, there is no disclosure, teaching, or suggestion in Hailey I of a plurality of cutting elements *arranged* to perform that balance. According to Federal Circuit caselaw, an element of a claim is inherently disclosed in a prior art reference when a person of ordinary skill in the art would recognize its presence. *Continental Can Co. USA, Inc. v. Monsanto Co.*, 948 F.2d 1264, 1268 (Fed. Cir. 1995). In this case, the Examiner has not submitted any evidence to show that a person of ordinary skill would recognize the presence of substantially balanced forces, work, or mass between blades **24a** and **24b** from the disclosure of Hailey I.

Furthermore, in the '134 Application, "force balance" refers to the substantial balancing of axial force during drilling between cutting elements on the reaming pads. (Application page 17, ¶50). Similarly, work balancing refers to a substantial balancing of work performed between the reamer pads and between cutting elements on the reamer pads. (Application page 18, ¶50). As such, "balancing" as described in the '134 Application refers not only to balancing of properties across reamer pads, but also across cutting elements within cutting blades of the reamer pads.

Referring to Figure 3 of Hailey I, it is apparent, that even if the structure is considered to be in accordance with the pad-blade-cutter limitations of the first three clauses of independent claim 201 as described above, the plurality of cutting elements allegedly disclosed therein does not balance any of the parameters recited across the plurality of cutting elements within said blades. Specifically, because of the arced configuration of blades **24a** and **24b**, any interaction such blades would have with a borehole wall would result in point contact therebetween. As

such, the forces, mass, and work would not be capable of being balanced across the cutting elements of blades **24a** and **24b**.

Particularly, for the reasons outlined above and below, Hailey I does not disclose at least two reamer pads. Next, Hailey I does not disclose at least one blade formed on at least one of the reamer pads. Finally, Hailey I does not disclose cutting elements arranged on at least one blade to substantially balance force, work, or mass. Therefore, the cutting elements, if any, of Hailey I do not substantially balance axial force, lateral force, work or mass between the at least two reamer pads as required by claim 201.

As the Hailey I patent does not disclose each and every element of the invention as arranged in independent claim 201, it is not a proper anticipating reference under 35 U.S.C. §102(b). *See Brown*, 265 F.3d at 1351. Similarly, the Hailey I patent does not disclose each and every element of the invention as arranged in dependent claims 202-204, 206, 207, 210-212, 217, and 218. Therefore, Appellant respectfully requests reversal of the rejection of claims 201-204, 206, 207, 210-212, 217, and 218 under 35 U.S.C. §102(b).

C. The Ream While Drilling Limitation

Appellant respectfully asserts that Hailey I fails to disclose what one of ordinary skill in the art would consider to be a reamer. Particularly, the expandable cutting tool disclosed by Hailey I is designed for cleaning out sediment and deposits within tubing disposed within a wellbore. (Hailey I, column 2, lines 45-58). In reference to Figure 2 of Hailey I, the expandable cutting tool is operated by expanding the cutter blades **24a** and **24b** until they progress to the inner wall of the tubing, after which the expandable cutting tool may be raised and lowered with repetition to accomplish the desired cleaning. (*Id.*). Appellant respectfully notes that this

cleaning is not equivalent to reaming as defined by those of ordinary skill in the art. Further, the expandable cutting tool disclosed in Hailey I is incapable of reaming *while drilling* because of the arrangement of cutting blades. Cutting blades **24a** and **24b** are configured so as to only be capable of cutting when displaced in an upward direction and *drilling* only occurs in a downward direction. More particularly, cutting blades **24a** and **24b** are configured to cut sediment and deposits when expanded against the material to be cut and reciprocated up and down against that material under pressure to further open blades **24a** and **24b**. (Hailey I, column 2, lines 45-58).

Typically, a reaming while drilling operation involves a pilot bit followed by a reamer configured to ream an under gauge pilot bore to gauge as it is rotatably and axially engaged into the borehole behind the pilot bit. Referring to Figure 3 of Hailey I, there is no cutting structure located at lower points **38a** and **38b** of cutting blades **24a** and **24b** when the blades are in their expanded state. In order to ream *while drilling*, a cutting structure would be required at lower points **38a** and **38b** so that the pilot hole could be opened to full gauge simultaneously with the drilling operation. One of ordinary skill in the art would not consider a reaming while drilling operation to include stopping the forward progress of the drill bit to reciprocate the reamer up and down within the pilot bore until the gauge diameter is reached.

Therefore, Hailey I discloses an apparatus that is incapable of being used to simultaneously ream a borehole as it is drilled. The use of the apparatus described by Hailey I would require the stopping (*i.e.* temporary cessation) of drilling operations while the drillstring (containing the Hailey I device) is rotated and reciprocated up and down in the drilled borehole to expand that borehole to full gauge. As a drill bit would not be in contact with the bottom of the borehole throughout this recropication, the drill bit could not be considered to be *drilling* during such an operation. Therefore, the simultaneous *drilling* and *reaming* of a borehole, a

requirement of a “reaming while drilling” apparatus, would not be possible with devices disclosed by Hailey I.

Additionally, it should be noted that in for the first time in the final Office Action, the Examiner relied on the disclosure of U.S. Patent No. 4,809,793 (“Hailey II”) in rejecting claims 201-204, 206, 207, 210-212, 217, and 218 under 35 U.S.C. §102(b). Particularly, the Examiner relied on Hailey II to support his contention that the device of Hailey I could be used to ream while drilling. In response, Appellant respectfully traverses the Examiner’s rejection on the basis that: a) the rejection is improper in that Hailey II cannot be used in conjunction with Hailey I to anticipate a claim under 35 U.S.C. §102; and b) if the rejection is proper, it constitutes a new rejection and was improperly made final. As stated above, section 102 requires that each and every element of a claim be found within a *single* anticipating reference. *Brown v. 3M*, 265 F.3d at 1351. Since Hailey I and Hailey II were unrelated applications and neither was properly incorporated by reference into the other, the two references cannot be considered a single anticipating reference.

Nonetheless, if the Board considers the combination of Hailey I and Hailey II under 35 U.S.C. §102 to be proper, Appellant respectfully traverses on the basis that the proposed combination does not teach, disclose, or suggest the invention as claimed. Particularly, the Examiner alleges the Hailey II patent discloses cutting blades that may be used to ream while drilling. However, the device of Hailey II is not recited as a reamer to be run behind a pilot bit in drilling a wellbore, but instead is recited as a wellbore cleanout tool. (Hailey II, column 4, lines 26-50). Particularly, the wellbore cleanout tool of Hailey II is described as a tool to remove material (*e.g.* hardened cement) from a pre-existing borehole. (Hailey II, column 4, lines 51-55). There is no mention in Hailey II of using the tool disclosed therein in any reaming operation, one

where a borehole is enlarged from a smaller gauge to a larger gauge, let alone any use of the tool disclosed therein to ream *while* drilling a borehole.

Tools as described by Hailey I and Hailey II are useful in cleaning out materials from previously drilled boreholes. Particularly, following cementing operations, such tools are frequently run to break up and remove extraneous cement deposits that remain behind. Such tools are therefore designed to be run at finite distances for short lengths of time and not for long distances at the increased time intervals required in a reaming while drilling operation. Therefore, tools disclosed in Hailey II would not be capable of performing reaming while drilling operations as required in claim 201.

Therefore, as the Hailey I (either alone or in conjunction with Hailey II) patent does not disclose each and every element of the invention as arranged in independent claim 201, it is not a proper anticipating reference under 35 U.S.C. §102(b). *See Brown*, 265 F.3d at 1351. Similarly, the Hailey I patent does not disclose each and every element of the invention as arranged in dependent claims 202-204, 206, 207, 210-212, 217, and 218. Therefore, Appellant respectfully requests reversal of the rejection of claims 201-204, 206, 207, 210-212, 217, and 218 under 35 U.S.C. §102(b).

D. Lack of Obviousness

While no rejection under 35 U.S.C. §103 currently stands before the Board, in the interest of expediting prosecution of the pending claims, Appellant takes this opportunity to note that the claims of the '134 Application are also not obvious in view of Hailey I, Hailey II, or any combination thereof. The heart of the statutory test of obviousness is found in the first sentence of 35 U.S.C. § 103, which denies patentability:

[I]f the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.

A conclusion of obviousness may be established on the basis of one or more prior art references. Before a conclusion of obviousness may be made based on a combination of references, however, there must have been a reason, suggestion, or motivation to combine the teachings of those references. *See ACS Hosp. Sys. Inc. v. Montefiore Hosp.*, 732 F.2d 1572, 1577 (Fed. Cir. 1984). The suggestion may come from the nature of a problem to be solved, leading inventors to look to references relating to possible solutions for that problem. *See, e.g., In re Rinehart*, 531 F.2d 1048, 1054 (C.C.P.A. 1976).

In the present case, the Hailey I patent not only does not teach, but actually teaches away from the invention as claimed. With regard to the reaming while drilling limitation of claim 201, tools of Hailey I and Hailey II teach away from their use in a reaming while drilling operation as outlined above in subheading C. In contrast, the Hailey I and Hailey II devices would require the cessation of drilling while a pilot bore is “reamed” to gauge. Such an operation would consume significant amounts of time and would preclude the drilling and reaming the pilot bore simultaneously as required by the term reaming *while* drilling. As a result, the disclosures of Hailey I and Hailey II teach away from the invention as disclosed and claimed in the ‘134 Application and a rejection under 35 U.S.C. 103(a) by Hailey I, Hailey II, or any combination thereof would be improper. *See In re Bell*, 991 F.2d 781, 784 (Fed. Cir 1993).

VIII. Conclusion

For the reasons presented above, claims 201-204, 206, 207, 210-212, 217 and 218 of the '134 Application are patentable over the cited art, as Hailey I does not disclose all of the limitations recited therein. *See Brown*, 265 F.3d at 1351. Therefore, the Appellant respectfully requests that the Board reverse the Examiner's rejections and allow all pending claims 201-218, of the '134 Application.

Please apply any charges not covered, or any credits, to Deposit Account 50-0591 (Reference No. 05516/089003).

Date: 11/17/05

Respectfully submitted,

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Claims Appendix

Claims of Record in the Application

201. An expandable reaming tool, comprising:
at least two reamer pads operatively coupled to a tool body and configured to be displaced between a retracted position and an expanded position;
at least one blade formed on at least one of the at least two reamer pads;
a plurality of cutting elements disposed on the at least one blade,
wherein the plurality of cutting elements are arranged so as to substantially balance at least one parameter selected from axial force, lateral force, work, and mass between the at least two reamer pads,
wherein the expandable reaming tool is configured to ream while drilling.
202. The expandable reaming tool of claim 201, wherein the plurality of cutting elements comprise at least one of polycrystalline diamond inserts, tungsten carbide inserts, and boron nitride inserts.
203. The expandable reaming tool of claim 201, further comprising at least one gage protection element disposed on a gage surface of the at least one blade.
204. The expandable reaming tool of claim 203, wherein the at least one gage protection element comprises at least one of a thermally stabilized polycrystalline insert and a polycrystalline diamond insert.
205. The expandable reaming tool of claim 201, further comprising a vibration damping insert disposed on the at least one blade.
206. The expandable reaming tool of claim 201, wherein the at least two reamer pads and the plurality of cutting elements are arranged to backream a formation in a wellbore.
207. The expandable reaming tool of claim 201, wherein the plurality of cutting elements are arranged to form a tapered cutting structure.

208. The expandable reaming tool of claim 201, wherein the plurality of cutting elements have backrake angles of greater than 20 degrees.

209. The expandable reaming tool of claim 201, wherein selected ones of the plurality of cutting elements have different backrake angles than other ones of the plurality of cutting elements.

210. The expandable reaming tool of claim 201, wherein each of the plurality of cutting elements has a diameter of less than 13.0 mm or greater than 13.0 mm.

211. The expandable reaming tool of claim 201, wherein selected ones of the plurality of cutting elements disposed on one of the at least two reamer pads are positioned so as to form a redundant cutting arrangement with other selected ones of the plurality of cutting elements disposed on a different one of the at least two reamer pads.

212. The expandable reaming tool of claim 201, wherein the at least two reamer pads and the plurality of cutting elements are configured to substantially mass balance the expandable reaming tool about an axis of rotation of the reaming tool.

213. The expandable reaming tool of claim 201, wherein the at least two reamer pads and the at least one blade are formed from a non-magnetic material.

214. The expandable reaming tool of claim 201, wherein the at least two reamer pads and the at least one blade are formed from a matrix material infiltrated with a binder alloy.

215. The expandable reaming tool of claim 201, wherein surfaces of the at least one blade proximate the plurality of cutting elements are shaped so that a cutting element exposure is equal to at least half of a diameter of the cutting element.

216. The expandable reaming tool of claim 201, wherein a perpendicular distance measured from a surface of the at least two reamer pads to an outermost extent of a gage cutting element disposed on the at least one blade is equal to at least twice a diameter of the gage cutting element.

217. The expandable reaming tool of claim 201, wherein a gage surface of the at least one blade comprises a hardfacing material.

218. The expandable reaming tool of claim 201, wherein a gage surface of the at least one blade is formed from a diamond impregnated material.

Evidence Appendix

Not applicable to the present Appeal.

Related Proceedings Appendix

No decisions by any Court or the Board have been rendered as of the time of this filing.